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ABSTRACT

The Mathematics Skills Improvement Project of the Cleveland Public Schools is designed to serve pupils in grades 3-6 (grades 3-8 in nonpublic schools) who have difficulty in acquiring basic math skills. The project provides daily remedial instruction in specially equipped math labs on an individual and small-group basis. Additional project services include workshops and inservice training for the project's math teachers; parent involvement; teaching technique demonstrations for regular classroom teachers; and the publication of a newsletter for parents and staff. Evaluation of the 1982-83 data showed that the project delivered services essentially as proposed. Grade 5 public school pupils surpassed their expected achievement gains, while those in grades 4 and 6 did not reach expected gains. Nonpublic school participants in grades 3-7 reached their expected level of achievement, but grade 8 pupils did not. In addition, parent involvement was satisfactory, and parent attitudes toward the project were very positive. Finally, although there was no formal assessment of staff attitudes toward inservice activities, a number of project teachers privately affirmed their positive value. (CMG)

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MATHEMATICS SKILLS IMPROVEMENT PROJECT

ECIA CHAPTER 1

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1982-83
EVALUATION REPORT

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DEPARTMENT OF RESEARCH AND ANALYSIS

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UD023356

MATHEMATICS SKILLS IMPROVEMENT PROJECT

1982-83 Chapter 1 Evaluation

PURPOSE AND OVERVIEW

The Mathematics Skills Improvement Project (MSIP) is designed to serve pupils in Grades 3-6 (3-8 in nonpublic schools) who have demonstrated difficulties in the acquisition of basic mathematics skills. Mathematics consultant teachers provide these students with daily remedial instruction in specially equipped mathematics laboratories outside the regular classroom. The project provides services on an individual and small-group basis, supplementing the mathematics instruction provided by the regular classroom teacher. Additional project services include workshops and inservice training for the Chapter 1 mathematics consultant teachers, involvement of parents in the instructional program of the project, demonstrations of mathematics teaching techniques for regular classroom teachers, and publication of a newsletter to disseminate pertinent information about the project to parents and staff.

SERVICE SUMMARY

Pupils Served: 2,079 Grades Served: 3-6 public Years in Operation: 1½
3-8 nonpublic

Schools: 29 Public
6 Nonpublic
35 Total
(See List Appendix A)

Staffing: 1 Project Manager, FT
35 Consultant Teachers, FT
1 Clerk, FT

*Total Chapter 1 Expenditures:

*Per Pupil Cost:

SUMMARY OF FINDINGS

The evaluation data indicated that the Mathematics Skills Improvement Project delivered program services essentially as proposed. Pupils in Grade 5 in public schools gained an average of 7.2 NCE units beyond the expected mean NCE score on the CTBS Mathematics Test, as demonstrated by a special statistical regression analysis. Although pupils in Grades 4 and 6 did not achieve the 7-NCE mean gain criterion, their mean gains of 3.5 and 6.0 NCE units respectively showed that the project had a positive impact on them. Nonpublic school participants in Grades 3-7 achieved the objective but Grade 8 pupils fell short by 0.3 NCE. Generally, the project attained process objectives. All schools except one began providing services within the specified two-week time frame. Maintaining the proposed enrollment levels remained a problem in nonpublic schools, but 28 of 29 public schools were successful in this area. The project conducted extensive parent involvement activities; the attitudes of parents toward the project were highly positive. The project administration provided a series of staff development activities for MSIP teachers.

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*Costs not available at time of report preparation

OBJECTIVES AND OUTCOMES

. Process Objective 1: Each full-time MSIP teacher will provide an average daily enrollment of 52-56 mathematics underachievers from Grades 3 through 8 with remedial instruction in mathematics skills.

. Outcome: Process Objective 1 has been attained in 28 of 29 public schools. However, no participating nonpublic school attained the objective. Monthly enrollment records indicated a project-wide average of 54.6 children enrolled in project classes. In public schools the average monthly enrollment ranged from 57.7 pupils to 49.2 pupils, a mean monthly enrollment of 55.2 pupils. In nonpublic schools the average monthly enrollment ranged from 50.3 pupils to 36.7 pupils per month, a mean monthly enrollment of 43.4 pupils.

Records maintained by the project office showed that a large majority of the 2,079 pupils served, 1,933 pupils or 93%, were concentrated in Grades 4-6, with the largest group, 736 pupils, in Grade 4. Appendices A and B list, respectively, the schools served and the project enrollment by grade and school type.

. Process Objective 2: Each MSIP Math Lab will open for instruction by the end of the second week of the school year.

. Outcome: Process Objective 2 has been attained in 28 of 29 public schools (97%) and in all six nonpublic schools (100%). The project administration has interpreted the end of the second week of school as the tenth school day of the year. The Cleveland Public Schools opened on September 7, 1982, the day after Labor Day. MSIP laboratories in all projected public schools, except one, opened by September 20, 1982, the tenth school day of the year. The public school which did not attain the objective opened only three days later. The last nonpublic MSIP laboratory opened on September 14, 1982, in a school whose first full day of classes corresponded with the opening of the Cleveland Public Schools.

. Process Objective 3: When surveyed, a parent (guardian) of at least 75% of MSIP pupils will be able to acknowledge involvement in the Mathematics Skills Improvement Project.

. Outcome: Process Objective 3 has been attained. Respondents to the Mathematics Skills Improvement Project Parent Survey demonstrated extensive involvement in the project and in the education of their children. The Parent Survey was distributed

to a random sample of 314 families of project participants. Parents of 246 pupils responded, as shown in the summary of the results presented in Appendix C. Analysis of the data revealed that parents generally were aware of their children's participation in the program and observed behavioral changes in the pupils effected as a result of project intervention. Key findings of the survey results included:

- Parents of 229 participants (93%) reported knowledge that their child had received extra instruction in mathematics.
- Parents of 222 pupils (90%) were aware that their child had brought home papers or other materials from the Math Skills teacher.
- Parents of 196 pupils (80%) reported that their child seemed to discuss math class more in 1982-83 than before.
- Parents of 226 project participants (92%) believed that their child had improved in mathematics more in 1982-83 than before.
- On the other hand, only 133 respondents (54%) reported that they actually had visited their child's Math Skills Class.

- Process Objective 4: At least 75% of the project staff will state that the preservice/inservice training of the program provided an overall positive contribution to their professional development.
  - Outcome: Process Objective 4 has not been addressed. The formal survey of project staff to assess the value of project preservice/inservice training inadvertently was omitted. However, in private conversations, a number of project teachers affirmed the positive value of the 11 sessions held during the 1982-83 MSIP inservice program. Appendix D presents the schedule of the 1982-83 MSIP Staff Inservice Program.

- Product Objective 1: The observed group mean posttest performance of MSIP pupils will be at least seven (+7) NCE units above the expected group mean score which has been estimated by regression analysis using CTBS Mathematics Test Scores, including both the Computation and the Concepts and Applications Subtests for Grades 3 through 8.
  - Outcome: Product Objective 1 has been partially attained. Results of the special regression analysis conducted to demonstrate the effects of project service showed that at Grade 5 pupils gained an average of 7.2 NCE units above the expected group mean on the CTBS Mathematics Total score. This gain, which reflects both the Computations Subtest and the Concepts and Applications Subtest is directly attributable to project

intervention, exceeding the 7-NCE criterion established to measure attainment of the objective. Table 1, p. 5, shows that although pupils in Grades 4 and 6 posted statistically significant mean gains over the expected mean NCE score, the magnitude of the gains did not satisfy the 7-NCE criterion for attainment.

Participating nonpublic schools necessarily followed the Title I Model A Evaluation approach because there exists no accessible file of previous-year standardized test scores upon which to base a regression analysis. Consequently, the project pre- and posttested students selected for service using appropriate forms and levels of the CTBS Mathematics tests. (See Appendix E.) Results of the data analysis presented in Table 2, p. 6, indicated that all grade levels, except Grade 8, project students achieved the minimum 7-NCE gain stated in the objective. (Achievement of students in Grade 8 fell short of the criterion for attainment by 0.3 NCE.) Supplementary t-tests performed on pairs of mean NCE scores from pre- to posttest verify statistically the extremely low probability ($p. < .0001$) that the gains could have occurred by chance.

ADDITIONAL FINDINGS

Data submitted monthly by the Math Skills teachers to the project coordinator supported the findings of high parent involvement. Selected examples of parent involvement reported by project teachers in 1982-83 included.

- 874 telephone calls to parents;
- 12,153 written communications to parents;
- 2,422 pupil progress reports sent to parents;
- 2,540 project-owned items loaned to pupils to reinforce at home concepts learned in Math Skills Labs.

In addition, 415 parents attended school-and-district-level project and Chapter 1 parent meetings, 77 parents generously contributed 410 hours of volunteer time to aid the project, and teachers held 855 conferences with parents to discuss pupil progress (Duplicated counts).

Project teachers screened pupil records at the close of the 1981-82 school year in order to prepare tentative lists of students eligible for service in the 1982-83 school year. This procedure enabled the MSIP Math Labs to begin operation very soon after the beginning of the school year.

Table 1

Actual and Expected CTBS Total Mathematics Posttest NCE Scores of Students Participating in Mathematics Skills Improvement Program

Grade	N	MEAN NCE SCORES			T-TESTS	
		Expected Average NCE Score	Actual Average NCE Score	Actual-Expected Difference	t Value	Probability
4	467	38.3	41.8	3.5	4.98	$p. < .0001$
5	482	34.0	41.2	7.2	10.81	$p. < .0001$
6	331	34.7	40.7	6.0	10.45	$p. < .0001$

Table 2
1982-83 CHAPTER 1 MATHEMATICS SKILLS IMPROVEMENT PROJECT
SUMMARY OF NCE GAINS AND SUPPLEMENTARY T-TESTS RESULTS
CTBS MATHEMATICS TOTAL SUBTEST SCORES
NONPUBLIC SCHOOLS

Grade	Form Level	N	MEAN NCE SCORES			T-TESTS	
			Pretest	Posttest	Gain	t	Probability
3	S-1	47	28.1	49.1	21.0	11.94	$p \leq .0001$
4	S-2	54	27.2	48.0	20.8	9.31	$p < .0001$
5	T-2	44	36.5	47.2	10.7	5.75	$p \leq .0001$
6	S-2	58	36.1	44.6	8.5	6.77	$p < .0001$
7	S-3	32	37.1	49.7	12.6	7.03	$p < .0001$
8	S-3	31	40.2	46.9	6.7	4.48	$p < .0001$

Although pupils in Grades 4 and 6 in project public schools and pupils in Grade 8 in nonpublic schools did not post sufficient mean gains to attain the objective, project intervention clearly had a positive impact on the students since every positive NCE reflects a gain beyond expectancy. The three groups under discussion posted mean gains of 3.5, 6.0, and 6.7 NCE units respectively.

CONCLUSIONS

The project provided supplementary mathematics instruction in small group settings for nearly 2,100 elementary school students who had demonstrated weaknesses in mathematics skills. Program enrollment was maintained at proposed levels in the public schools, but some difficulty was noted in maintaining proposed levels in nonpublic schools.

Analysis of evaluation data showed that, with some exceptions the Mathematics Skills Improvement Project delivered program services as proposed. Process Objective 1 was attained in 28 of 29 public schools (97%); however, no participating nonpublic school was able to maintain the proposed enrollment. Attainment of Process Objective 2, demonstrated by the commencement of project services within two weeks after the start of the school year, occurred in 28 of 29 public schools (97%) and all six nonpublic schools (100%).

The enthusiastic response to the Parent Survey by a sample of parents indicated the attainment of Process Objective 3 and reflected the high degree of parent involvement achieved by the project. Parents of 229 participants (93% of 246 respondents) reported knowledge of their child's participation in the project, and 222 parents (90%) indicated their child had brought home materials from the Math Skills teacher. However, only 133 respondents (54%) stated they had visited the MSIP mathematics laboratory. Although Process Objective 4 was not assessed formally, a number of project teachers privately affirmed the positive value of the staff in-service program held in 1982-83.

Product Objective 1 was partially attained. Analysis of data in public schools using a special regression model showed that at Grade 5 project pupils attained the Objective, their mean gain rising 7.2 NCE units beyond the expected mean on the Spring, 1983 administration of the CTBS Mathematics Test. Although pupils in Grades 4 and 6 posted mean gains of 3.5 and 6.0 NCE units, respectively, their gains did not satisfy the criterion for attainment of the objective, 7.0 NCE units.

In the nonpublic schools a pre/posttest evaluation model was necessary because an insufficient test score base existed to perform a regression analysis. Mean gains beyond the 7-NCE criterion occurred in Grades 3-7; for Grade 8, the mean gain fell short by 0.3 NCE.

These recommendations are made:

- Continue the project, placing special emphasis on increasing the effectiveness of program services to pupils in Grade 4.

- Take measures to increase parent visitations to MSIP mathematics laboratories.

- Investigate the possibility of transporting pupils from nearby nonpublic schools to under-utilized MSIP mathematics laboratories in nonpublic schools in order to extend project services to additional eligible nonpublic pupils, to obtain maximal service from project teachers in nonpublic schools, and to ensure the establishment and maintenance of the specified average daily enrollment of 52-56 participating pupils in project schools.

APPENDIX A

LIST OF SCHOOLS SERVED

Public

A. J. Rickoff
Anthony Wayne
Buhrer
Case
Charles H. Lake
Clark
Daniel E. Morgan
Forest Hill Parkway
George W. Carver
Halle
Kentucky
Margaret Ireland
Marion Sterling
Mary B. Martin
Mary M. Bethune
McKinley
Miles Park
Milford
Mount Pleasant
Oliver H. Perry
Orchard
Paul Revere
Stephen E. Howe
Tremont
Union
Wade Park
Walton
Warner
Watterson-Lake

Nonpublic

Annunciation
Mt. Pleasant Catholic
Our Lady of Lourdes
St. Benedict
St. Catherine
St. Mary Byzantine

APPENDIX B

ENROLLMENT BY GRADE AND SCHOOL TYPE

Grade	Number of Pupils		
	Public	Nonpublic	Total
Grade 3	17	54	71
Grade 4	674	62	736
Grade 5	652	52	704
Grade 6	423	70	493
Grade 7	---	42	42
Grade 8	---	33	33
Total	1,766	313	2,079

CLEVELAND PUBLIC SCHOOLS

Mathematics Skills Improvement Project

PARENT SURVEY

Dear Parent,

We are pleased that your child was chosen to participate in the Mathematics Skills Improvement Project. We now wish to know how you feel about the program. Please help us by circling your answers to the questions below.

			N	PCT.		N	PCT.
1.	Did you know that your child was receiving extra instruction in mathematics?	YES	229	93.1%	NO	17	6.9%
	Did you learn that your child was chosen to be in the program by means of: (Circle as many as apply.)						
2.	A letter sent home from the school?	YES	203	82.5%	NO	43	17.5%
3.	A phone call from someone at school?	YES	39	15.9%	NO	207	84.1%
4.	A home visit by someone from school?	YES	9	3.7%	NO	237	96.3%
5.	Your child just telling you?	YES	125	50.8%	NO	121	49.2%
6.	Did the school send you written information explaining the project?	YES	181	73.6%	NO	65	26.4%
7.	Have you visited your child's Math Skills class this year?	YES	133	54.1%	NO	118	45.9%
8.	Did your child ever bring home a math paper or any other object from his/her Math Skills teacher?	YES	222	90.2%	NO	24	8.8%
9.	Did your child seem to talk to you more about math class this year than before?	YES	196	79.7%	NO	50	20.3%
10.	Do you feel your child improved in math more this year than before?	YES	226	91.9%	NO	20	8.1%

Please ask your child to take this questionnaire to his/her Math Skills teacher on the next school day.

Thank you very much.

DATE	LOCATION	TOPIC	AUDIENCE	PRESENTER
9/17/82	Max Hayes Annex	Orientation Meeting	MSIP Staff	Eloise H. Blocker Dr. John P. Nairus
10/26/82	St. Benedict	Discipline	Staff Patricia Bowman	Dr. Gerald Jorgenson
11/16/82	Max Hayes Annex	Mastery Learning	Staff	Patricia Bowman
12/16/82	Teddis' Restaurant	Luncheon MSIP Concerns	Staff	Eloise H. Blocker
1/13/83	Media Center/ Murray Hill	Computer Inservice	Math Teachers with computers in Lab	Wallace Havenhill
1/18/83	Media Center/ Murray Hill	Computer Inservice	Math Teachers with computers in Lab	Wallace Havenhill
1/25/83	Max Hayes Annex	Mastery Learning Objectives	Staff	Carol Archuletta Bill Bauer Eloise H. Blocker
2/18/83	Max Hayes Annex	Mastery Learning Objectives	Staff	Carol Archuletta Bill Bauer Eloise H. Blocker
4/29/83	Max Hayes Annex	Problem Solving	Staff	Eloise H. Blocker Dorothy Phillips Mattie Williams
5/27/83	Max Hayes Annex	Problem Solving	Staff Patricia Bowman Ronald Handy	Consultants from Harper & Row Book Company Dr. John P. Nairus
6/10/83	Cleveland Crate and Trucking Restaurant	Luncheon MSIP Concerns	Staff	Eloise H. Blocker

MATHEMATICS SKILLS IMPROVEMENT PROJECT STAFF MEETINGS

APPENDIX E

FORMS, AND LEVELS OF COMPREHENSIVE TESTS
OF BASIC SKILLS USED IN EVALUATION OF MATHEMATICS SKILLS
IMPROVEMENT PROGRAM IN NONPUBLIC SCHOOLS

1982-83

Grade	Level	Form
3	1	S
4	2	S
5	2	T
6	2	S
7	3	S
8	3	S